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rock will have but one-third his usual income from that chair. It is important that we keep him in Philadelphia. I therefore recommend an appropriation of \$330 for a course of fourteen lectures in the Park.

The year 1880 was most abundant in tree seed, and they were gathered in quantities much greater than ever before and in more varieties. We have planted the Hardy Catalpa in large quantity and have the seed for planting this spring; also the seeds of the White Cedar, both very valuable for enduring wood.

ELI K. PRICE, *Chairman, &c.*

It was, on motion,

Resolved, That \$330 be appropriated for the Michaux lectures.

On motion it was resolved that the whole subject of stereotyping and printing separately the publications of the Society for convenience in meeting such requests as that of Mr. Barber, in his letter of the 4th inst., be referred to the Committee on Publication, with the Treasurer, to report.

New nominations Nos. 928 to 931 were read.

And the meeting was adjourned.

On a Cours de Botanique Fossile by Prof. M. B. Renault.
By Leo Lesquereux.

(Read before the American Philosophical Society, February 18, 1881.)

In this course of lectures given by Prof. Renault in the museum of natural history of Paris, the author gives very interesting details on the results he has obtained from anatomical analysis of silicified specimens of fossil plants. The volume recently published exposes the characters of a single group, the *Cicadeæ*, which the celebrated phyto-paleontologist has followed in all their subdivisions and modifications from the present age to the Devonian. These researches throw some new light on the nature or internal structure of some plants of the coal measures, especially the *Cordaites*, the *Sigillariae* and *Stigmariae*.

Prof. Renault divides the *Cicadeæ*, from the structure of the wood, trunks and leaves, in five groups or families, which from a difference in the essential characters of the wood he subdivides in two sections, A. B.

The plants are composed of vascular vessels forming two juxtaposed woody parts inversely increasing the one toward the centre (centripetal), the other toward the outside (centrifugal). This double increase is going on in both the leaves and the stems. To section A are referable the *Cicadeæ*, the *Zamiæ*, the *Cicadoxylæ*, and the *Cordaites*, to B the *Poroxylæ* and the *Sigillariae* with the *Stigmariae*.

The *Cordaites* and the *Sigillariae* being now well known from American

specimens, are the only of these families which are interesting to the botanical paleontology of this country.

For the *Cordaites*, Prof. Renault has given very detailed anatomical descriptions and splendid illustrations of all the organs of these plants, as complete indeed as if they had been made from living vegetables. The development of the plants is followed from the fertilization of the ovule; for grains of pollen have been discovered, by vertically cutting the embryonic bodies, one already enclosed into the pollinic chamber, two of them still on their way downward in the pollinic tube.

The first of these grains is fully ripe, as recognized by the author, who has been enabled to see a difference in the mode of fertilization from the difference of size and structure of the grains of pollen which were as profusely disseminated around, at the Carboniferous epoch, as are those of the Conifers at our time. When found in a state of dissemination, the grains of pollen of the *Cordaites* are already a third larger than those still fixed to the anthers, and they appear then composed of an internal globule (entine), and of an outside envelope (extine). On the grains still placed in the pollinic tube, the fertilizing globule is more distinct, and more distinctly separated from the envelope, while the grain placed in the pollinic chamber is still larger, and its two parts more distinct. It seems therefore, according to the remarks of the author, that in their exit from the anthers, the pollinic grains are not fully ripe or prepared for the act of fecundation, and that they have need of a second process of evolution, while enclosed in the pollinic chamber, for a full separation of the cells and the completion of the fertilizing action. This process differs from what is remarked in the plants of the present time, by the fact only, that now the pollinic grain is already perfect, when it becomes detached from the anther, and is not surrounded by a membrane.

The wood of the trunks of *Cordaites* is composed of a thick pith or medullary cylinder, which is generally known under the name of *Artisia* or *Sternbergia*. The medullary cylinder very variable in thickness is obscurely costate lengthwise and transversely marked by close parallel furrows, sometimes anastomosing with each other. These furrows are formed, as seen from the anatomical analysis of silicified branches, by medullary transversal bands, which in the living plants, produced a division of the medial cylinder into as many empty excavations, each corresponding, by contraction of the surface, to an outside furrow.

The wood itself is formed in its inside part, or in contact with the medullary axis, of two zones; the inside of the first is composed of annulate and spiral trachids, its outside of radiate and reticulate ones separated by the medullary rays. The trachids of this last zone gradually pass, by the enlarging of the striae of their walls, into punctate trachids, which constitute a second woody zone, which is of considerable thickness in large trunks, and always composed of trachids with areolate perforations, disposed in radiating striae, and separated also by medullary rays. The areoles are in contact; by mutual compression they become hexagonal, and are pierced

in the centre by small pores or inclined fissures, which, by contraction or widening, become elliptical or round. In badly preserved or old specimens the pores occupy nearly the whole space of the areoles.

The characters of the wood of *Cordaites* as exposed above are much like those of the wood of some Conifers, and from this affinity, the fossil fragments of wood or trunks discovered in the Devonian and the Carboniferous, have been generally referred by authors to Conifers. *Dadoxylon* Endl., *Araucarites* Gœpp., *Pinites* Lind. and Hutt. are all referable to *Cordaites*. It is now well known that *Lomatophloios*, to which Corda referred the medullary cylinder of *Artisia*, has a far different kind of pith.

Considering especially the structure of the trunks of *Cordaites* and the character of the fructifications, Prof. Renault finds a relation between these plants and the *Cycadeæ*, from which they greatly differ, however, by their mode of growth and stature. The disposition of the flowers has some analogy with that of the *Taxineæ* or *Genetaceæ*.

The *Poroxyleæ* do not offer any remark applicable to what is known of fossil plants of this continent. They are represented by fossil trunks, of which three species are described by the author.

The *Sigillarieæ* and the *Stigmarieæ*, on the contrary, are of peculiar interest on account of the great abundance of their remains disseminated over and in the whole thickness of the American Coal measures, sometimes constituting whole strata of combustible mineral.

Prof. Renault finds, in the wood of *Sigillaria*, medullary rays, an endogenous and an exogenous zone, and vascular fascicles originating between the zones and constituting the strings of vessels entering and composing the leaves. These characters relate them to phanogamous gymnosperms.

From anatomical researches, Brongniart had come to the same conclusion, which is supported also by Saporta and Grand 'Eury. On the contrary Profs. Hooker, Williamson, Binney of England, who have pursued repeated observations and made numerous and very careful anatomical analysis of the wood of *Sigillaria*, find in it the characters of Lycopodiaceous plants, and relate them to *Lepidodendron*.

The discordance of views may result, as supposed by Prof. Renault, from the difference of age of the plants from which were derived the specimens subjected to analysis. But the supposition is strongly contradicted by Prof. Williamson in a recently published paper, on the organization of the Fossil Plants of the Coal measures.* To follow the details of the discussion on this very interesting question it would be necessary to have the illustrations under the eyes.

We have no means of comparing the determination of the celebrated authors. All that I know and can see from American specimens of the outside characters of *Lepidodendron* and *Sigillaria* indicates a close typical relation of both genera, and therefore in the U. S. coal flora I have placed the genus *Sigillaria* in the *Lycopodiaceæ*.

Stigmaria necessarily follow *Sigillaria*; for remains of *Stigmaria* have

* Proc. of the Royal Soc., No. 205, 1880.

been found attached to trunks of *Sigillaria* as roots. From this fact *Stigmaria* plants have been generally admitted as true roots and are so in certain circumstances.

On this subject Prof. Williamson says, that *Stigmaria* belongs alike to *Lepidodendron* and to *Sigillaria* as root. I have never seen any positive relation of these two genera of plants, or never found any remains of *Stigmaria* in connection with those of *Lepidodendron*. Even in what seems to be a creeping state, or rooting like that of some Lycopods, the small intertexted stems of *Lepidodendron* exactly preserve the peculiar form of their leaf-scars and never have round areoles like *Stigmaria*.

What was known formerly of the structure of these plants by the anatomical analysis of phytopaleontologists is confirmed by the researches of Prof. Renault. However, from the mode of life of the *Stigmaria* which in certain cases and for long periods of time appear to have had an independent vegetation, he supposes that these plants are of two kinds; some roots, others rhizomas.

In transversal section of *Stigmaria ficoides*, he has observed as obliquely traversing the woody cylinders two kinds of vascular fascicles, the first numerous, reaching to the outside, true vascular bundles of leaves; the others less numerous in the interior of the wood, which represent fascicles of roots. Hence in certain circumstances *Stigmaria* plants bear leaves; in others, fascicles of roots may be developed.

I have already at different times exposed my views on the variable nature of these plants according to their mode of vegetation. They have been more recently resumed in the description of the genus *Stigmaria*, Coal Flora of Pennsylvania and the United States, 1881, page 500, &c., and I think that they agree in all essential points with the opinion of the French author. *Stigmaria* as stems (or rhizomas) have lived independently and for long periods of time floating at the surface of the swamps of the Carboniferous, or covering the soft mud, without producing any fructifications. In this case the stems, horizontal, rarely branching (dichotomous), preserve a uniform size, and bear also tubulous leaves only, more or less regularly disposed in spiral, no rootlets. Wide surfaces of rocks are covered with plants of this kind, and thick strata of clay are filled or composed of their remains, without any fragments or traces of *Sigillaria*. This vegetation may be called adventive. But in another case the germinating process may begin on sand or on a floating carpet of stems of *Stigmaria*, having become compact and solid enough to support trees. Then the growth of the plant from the production of a vertical bud proceeds upward and downward, and the basilar appendages, first obliquely inclined downward, become gradually more or less vertical as true roots and bear rootlets, often still mixed with leaves, as seen by their scars of different size and conformation. This kind of vegetation finds an analogy in that of a number of floating plants of our time: Mosses, Lycopods, etc.*

* Grand'Eury has lately, in exploring the coal fields of Germany, recognized these two distinct modes of vegetation of the *Stigmaria*.

The work of Prof. Renault is closed by remarks on the geological distribution of the plants of the families which he has examined.

The *Cicadæ* appear in the Carboniferous by *Pterophyllum carbonarium* and persist through the more recent formations to our time.

The *Zamia* have also a carboniferous species *Næggerathia foliosa*, and a few others in the Jurassic.

The *Cycadoxylæ* are represented by fossil wood of the upper Carboniferous.

The *Cordaites*, the *Poroxylæ* and *Sigillariae* are all Carboniferous and Devonian ; a few ascending to the base of the Pernian.

Certain Almanacs Published in Philadelphia between 1705 and 1744.
By Henry Phillips, Jr.

(Read before the American Philosophical Society, February 18, 1881.)

In the library of our Society is a volume of Almanacs printed and published in Philadelphia, at various dates between 1705 and 1744.

They are remarkable specimens of the degree of perfection, or rather lack of perfection, to which the art of printing had attained in the Middle Colonies in those early days, beginning with extremely bad paper, blurred impressions and imperfect type, and exhibiting a progressive improvement towards the later dates, but nowhere showing, however, what now-a-days would be called a good piece of work.

The volume which is a duodecimo, consists of Jacob Taylor's Almanacs for 1705, 1706, 1709, 1711, 1712, 1719, 1720, 1723, 1727, 1738, 1740, 1741, 1743, 1744, and Titan Leed's Almanac for 1718.

As a curiosity I reproduce the title page of Taylor's Almanac for 1705, which will serve as a fair specimen of the manner in which publishers of that era were wont to attract the attention of the purchasing community.

An ALMANACK for the year 1705. | AN | EPHEMERIS | of the Motions and ASPECTS of the | PLANETS | and the Eclipses of the Luminaries for the Year | of English account 1705 | Fitted to the latitude of 40 Degrees North, and | the Longitude of 75 Degrees West of London; | serving Pensilvania and the Places adjacent. | By JACOB TAYLOR. | Hermes Trismegistus. Centiloq. Aphor. 33 | . Saturn Passing out of one sign into another causes strange Appari | tions in the Heavens which the Arabians term Asiub; & Cer | tain other signs of a fiery nature. | To which is added by C. P. some remarks on D. L's abuses | to the Quakers, in his this Years two ALMANACKS. | Printed at Philadelphia by Tiberius Johnson. | .

This Almanac is a small volume of sixteen leaves, pages unnumbered and without signatures.

On the recto of the title page is a "Table of the KINGS of England, shewing the Years wherein They began to Reign ; the Years which they have Reigned, and the Years since they Reigned."